

Nephrotheca, a new monotypic genus of the Compositae-Calenduleae from the southwestern Cape Province

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Abstract

Nephrotheca B. NORD & KÄLLERSJÖ is described as a new genus of the Compositae-Calenduleae. The single species *N. ilicifolia* (L.) B. NORD. & KÄLLERSJÖ is distributed in the southwestern Cape Province of South Africa. The species has previously been included in *Gibbaria* CASS. because of a similar fruit morphology, but is generically distinct on morphological and molecular evidence.

Introduction

Ongoing phylogenetic studies of the tribe Calenduleae have clearly demonstrated the polyphyletic nature of the small genus *Gibbaria* CASS. This genus was established by CASSINI (1817) with a single species, *G. bicolor* CASS. The genus was not well understood by later authors, e.g. HARVEY (1865), who listed it as a doubtful genus of the Arctotideae.

NORLINDH (1943) recognized *Gibbaria* as a distinct genus related to *Osteospermum* L. and especially to *Calendula* L. He noted that the generic type had been described already by THUNBERG (1800) as *Osteospermum scabrum* THUNB. DE CANDOLLE (1836) described the same taxon as *Xerothamnus ecklonianus* DC. without realizing its identity with *Osteospermum scabrum* THUNB. or *Gibbaria bicolor* CASS. As pointed out by NORLINDH (1943) the correct name of the type of *Gibbaria* is *G. scabra* (THUNB.) T. NORL.

However, NORLINDH (1943) added a second species, *G. ilicifolia* (L.) T. NORL., based on *Osteospermum ilicifolium* L. (LINNAEUS 1759). This is a well-known plant from the southwestern Cape, fairly common on Table Mountain, and illustrated as early as 1739 by BURMAN.

NORLINDH based his taxonomic decision on the generic position of *O. ilicifolium* on a single character, viz. the shape of the cypsela. This is curved and kidney-shaped and

also provided with a distinct ventral cavity in *Gibbaria scabra* as well as *O. ilicifolium* (Fig. 2).

However, these two species are very different in other important morphological characters (see below), and in our opinion they are not congeneric. This conclusion is also supported by molecular information obtained from an ongoing study of the entire tribe (KÄLLERSJÖ et al., in prep). Both species of *Gibbaria* were included in a phylogenetic analysis based on sequences from the *ndhF* and *trnL-F* genes, together with a representative sample of all recognized genera sensu NORDENSTAM (in press). The analysis placed the two *Gibbaria* species in very different parts of the tree (Fig. 3). *Gibbaria ilicifolia* was found as sister to all Calenduleae save *Garuleum* and *Dimorphotheca*, whereas *Gibbaria scabra* was nested within a group of *Osteospermums*, with *Osteospermum glabrum* N. E. Br. as its closest relative. To ensure that it was not a case of contamination we repeated the DNA extractions, PCR and sequencing, but the result was the same. Analyses using parsimony jackknifing (FARRIS et al. 1996) or Bayesian inference (HUELSENBECK & RONQUIST 2001) resulted completely congruent topologies.

A new monotypic genus is here described to accommodate the southwestern Cape species *Gibbaria ilicifolia*. The generic name *Nephrotheca* is inspired by the reniform cypselas.

***Nephrotheca* B. NORD. & KÄLLERSJÖ, gen. nov. (Compositae-Calenduleae)**

Frutex erectus vel diffusus ramosus usque ad 0.5 m altus glanduloso-hirtellus. Folia alterna sessilia ovato-oblonga ad lanceolata 2–6 cm longa 1–4 cm lata, apice mucronata, margine sinuato-dentata vel denticulata. Capitula solitaria breviter pedunculata heterogama radiata. Involucrum campanulatum; involucri bracteae 10–13 uniseriatae vel subbiseriatae lanceolatae 6–10 mm longae 1.5–2.5 mm latae. Flosculi radii feminei 10–13; ligulae flavae subter plerumque rubro-violaceae. Flosculi disci ♀-steriles, corolla flava quinquelobata. Cypselae homomorphae calvae glabrae incurvae reniformes 4–5 mm longae 2–3 mm latae cavernam ventralem includentes.

Type: *N. ilicifolia* (L.) B. NORD. & KÄLLERSJÖ.

Single species:

***Nephrotheca ilicifolia* (L.) B. NORD. & KÄLLERSJÖ, comb. nov.**

Basionym: *Osteospermum ilicifolium* L., Syst. Nat. ed. 10: 1234 (1759).

Lectotype, designated here: Herb. LINN 1037:9 (LINN). – Fig. 1.

N. ilicifolia is widespread in the southwestern Cape Province including Table Mountain and other parts of the Cape Peninsula, and also on mountain slopes up to ca. 1000 m s.m. northwards to Bains Kloof and French Hoek Mountains and eastwards

to Swellendam. It is a smelly glandular shrub or shrublet with flat oblong to ovate leaves with a dentate and scabrid margin. The solitary terminal capitula have phyllaries more or less in a single row, yellow ray-florets, sometimes with a reddish or purple tinge below, and the disc-florets are also yellow.

The genus *Gibbaria* CASS. is now likewise monotypic. *G. scabra* CASS. is a shrublet with a very different habit, with entire, linear to subulate and apically pungent leaves; the involucre bracts are imbricate, and the rays are white above and more or less orange-yellow below.

References

- BURMAN, J. 1739. *Rariorum africanarum plantarum*, p. 172, tab. 62. Boussière, Amsterdam.
- CANDOLLE, A. P. DE 1836. *Prodromus systematis regni vegetabilis* vol. 5. Treuttel & Würtz, Paris.
- CASSINI, H. 1817. 79. *Gibbaria*. *Bull. Sci. Soc. Phil.* 1817: 139.
- FARRIS, J. S., ALBERT, V. A., KÄLLERSJÖ, M., LIPSCOMB, D., & A. G. KLUGE. 1996. Parsimony jackknifing outperforms neighbour-joining. *Cladistics* 12: 99-124.
- HARVEY, W. H. 1865. Compositae. In: HARVEY, W. H. & O. W. SONDER, *Flora capensis* vol. 3. Hodges Smith & Co., Dublin; Juta, Cape Town.
- HUELSENBECK, J. P. & F. RONQUIST 2001. MrBAYES: Bayesian inference of phylogenetic trees. *Bioinformatics* 17: 754-755.
- KÄLLERSJÖ, M., NORDENSTAM, B., ELDENÄS, P., BARKER, N. P. & A. R. WOOD in prep. A re-evaluation of generic delimitations in the Calenduleae – morphological and molecular evidence (tentative title).
- LINNAEUS, C. 1759. *Systema naturae*, ed. 10. Imp. L. Salvii, Holmiae.
- NORDENSTAM, B. in press. Tribe Calenduleae. In: KADEREIT, J.W. & C. JEFFREY (eds.), *The Families and Genera of Vascular Plants*, vol. VIII (series ed., K. KUBITZKI). Flowering plants. Dicotyledons. Asterales. Berlin, Heidelberg, New York: Springer.
- NORLINDH, T. 1943. *Studies in the Calenduleae*. I. Monograph of the genera *Dimorphotheca*, *Castalis*, *Osteospermum*, *Gibbaria* and *Chrysanthemoides*. C. W.K. Gleerup, Lund.
- THUNBERG, C. P. 1800. *Prodromus plantarum capensium*, pars posterior. Joh. Fr. Edman, Upsaliae.



Fig. 1. Lectotype of *Osteospermum ilicifolium* L., generic type of *Nephrotheca*
B. NORD. & KÄLLERSJÖ. LINN 1037:9 (LINN).
"ilicifolium" in LINNAEUS' handwriting.

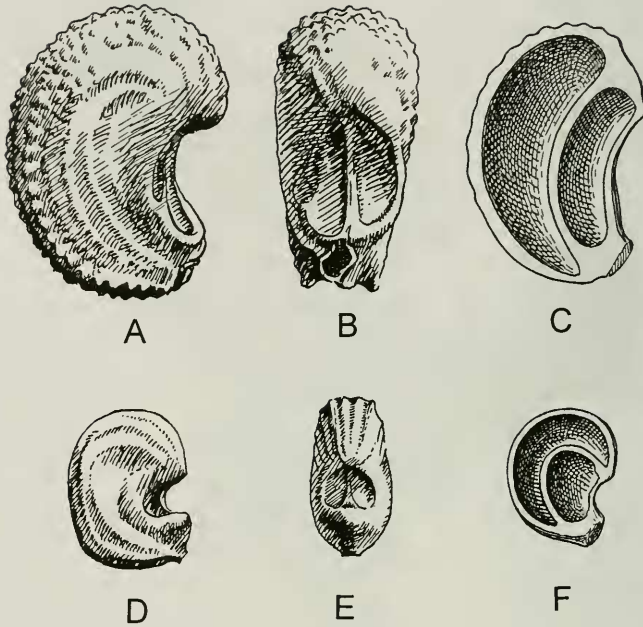


Fig. 2. Cypselas of *Nephrotheca ilicifolia* (L.)
 B. NORD. & KÄLLERSJÖ (A–C) and *Gibbaria scabra* (THUNB.) T. NORL. (D–F).
 A, D Radial side. B, E Ventral side. C, F Longitudinal section showing seed
 cavity (left) and ventral cavity (right). $\times 6$. From NORLINDH (1943).

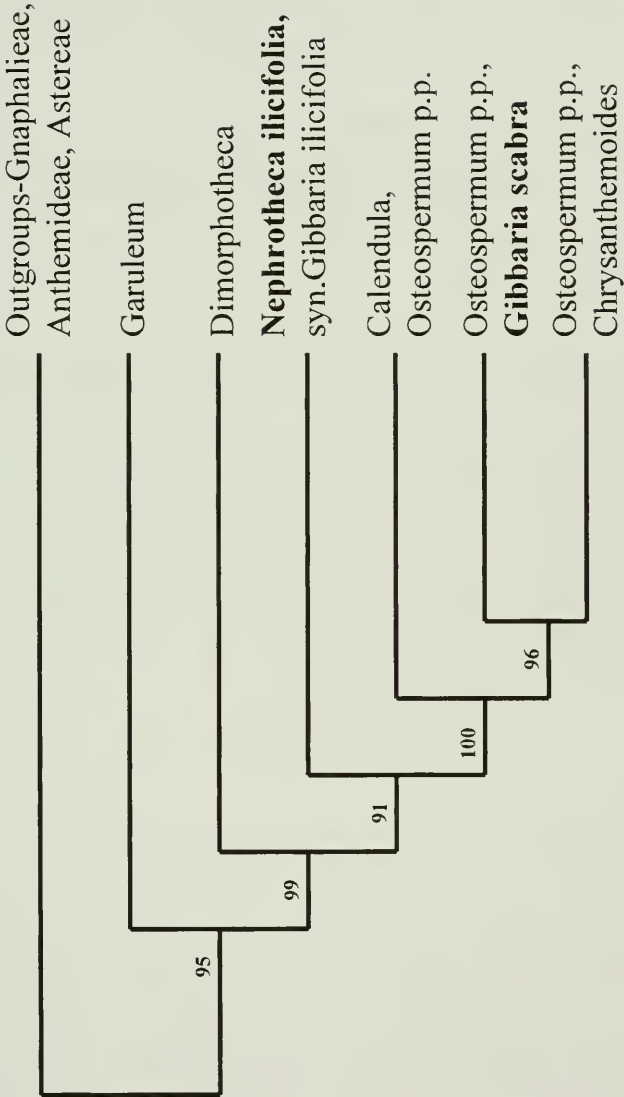


Fig. 3. Simplified parsimony jackknife tree showing the position of *Nephrotheca* in the tribe, based on *ndhF* and *trnL-F* sequence data. Numbers on nodes represent parsimony jackknife frequencies.